Claims

1. A method for producing a honeycomb structure which comprises disposing a material for forming an outer wall upon firing on outer peripheral surface of a cell structure having a plurality of cells serving as fluid flowing channels and partitioned by partition walls to produce a cell structure being provided with a material for forming outer wall and firing resulting cell structure being provided with a material for forming outer wall to obtain a honeycomb structure comprising the cell structure provided with the outer wall on the outer peripheral surface thereof, characterized in that the material for forming an outer wall is produced by using a cell structure and a material for forming outer wall which are combined so that an absolute value of difference between a proportion of shrinkage in the size of the cell structure after firing to the size of the cell structure before firing and a proportion of shrinkage in the size of the material for forming outer wall after firing to the size of the material for forming outer wall before firing is not more than 0.5%, and resulting cell structure being provided with a material for forming outer wall is fired.

2. A method for producing a honeycomb structure according to claim 1, wherein the main component of the cell structure and/or outer wall is a ceramics.

3. A method for producing a honeycomb structure according to claim 1 or 2, wherein the cell structure being provided with a material for forming outer wall is produced so

that the absolute value of the difference between the coefficient of thermal expansion of the cell structure after firing and that of the outer wall after firing is not more than $0.7 \times 10^{-6}/°C$.

5   4.   A method for producing a honeycomb structure according to any one of claims 1-3, wherein the cell structure being provided with a material for forming outer wall is produced so that the main component of the cell structure after firing becomes cordierite.

10   5.   A method for producing a honeycomb structure according to any one of claims 1-4, wherein the cell structure is unfired, the material for forming outer wall is disposed on the outer peripheral surface of the unfired cell structure to produce the cell structure being provided with a material for

15 forming outer wall, and the resulting cell structure being provided with a material for forming outer wall is fired.

6.   A method for producing a honeycomb structure according to any one of claims 1-4, wherein the cell structure is previously fired, the material for forming outer wall is

20 disposed on the outer peripheral surface of the fired cell structure to produce the cell structure being provided with a material for forming outer wall, and the resulting cell structure being provided with a material for forming outer wall is fired.

25   7.   A method for producing a honeycomb structure according to any one of claims 1-6, wherein the material for forming outer wall which forms the outer wall mainly composed of cordierite by firing is disposed.

8. A method for producing a honeycomb structure described in according to claim 7, wherein the material for forming outer wall which is prepared using at least one material selected from the group consisting of talc, calcined talc,

5 kaolin, calcined kaolin, alumina, aluminum hydroxide, mullite and silica so that the material for forming outer wall contains cordierite as a main component after firing is disposed on the outer peripheral surface of the cell structure to produce the cell structure being provided with a material for forming outer

10 wall and this cell structure being provided with a material for forming outer wall is fired to obtain the honeycomb structure having the outer wall containing cordierite as a main component.

9. A method for producing a honeycomb structure

15 according to any one of claims 6-8, wherein the material for forming outer wall contains a quartz powder in an amount of 1-15% by mass based on the whole material for forming outer wall.

10. A method for producing a honeycomb structure

20 according to any one of claims 1-9, wherein the cell structure being provided with a material for forming outer wall is produced by using the cell structure and the material for forming outer wall combined so that the absolute value of the difference between the proportion of shrinkage in the size of

25 the cell structure after firing to the size of the cell structure before firing and the proportion of shrinkage in the size of the material for forming outer wall after firing to the size of the material for forming outer wall before firing is

not more than 0.3%, and the resulting cell structure being provided with a material for forming outer wall is fired.

11. A method for producing a honeycomb structure according to any one of claims 1-10, wherein the cell structure being provided with a material for forming outer wall is produced so that the absolute value of the difference between the coefficient of thermal expansion of the cell structure after firing and that of the outer wall after firing is not more than $0.4 \times 10^{-6}/°C$.

12. A method for producing a honeycomb structure according to any one of claims 1-11, wherein the maximum diameter of a section formed by cutting the cell structure after firing along a plane perpendicular to the central axis is not less than 150 mm.

13. A method for producing a honeycomb structure according to any one of claims 1-12, wherein the outer peripheral surface of the cell structure is formed of the surface of the outer peripheral wall provided on the outside of the cells positioned at the outermost periphery among a plurality of the cells.

14. A method for producing a honeycomb structure according to any one of claims 1-12, wherein the outer peripheral surface of the cell structure is formed of the surface of the partition walls of the cells positioned at the outermost periphery among a plurality of the cells.

15. A method for producing a honeycomb structure according to any one of claims 1-12, wherein the outer peripheral surface of the cell structure is formed by grinding

at least a part of the outer peripheral wall of the cell structure comprising a plurality of cells serving as fluid flowing channels and provided with the outer peripheral wall on the outside of the cells positioned at the outermost

5 periphery among a plurality of the cells.

16. A method for producing a honeycomb structure according to any one of claims 1-15, wherein the surface of the outer wall of the honeycomb structure is subjected to a surface working.

10 17. A method for producing a honeycomb structure according to any one of claims 1-16, wherein the honeycomb structure is cylindrical and the difference between the maximum diameter and the minimum diameter of the cylindrical honeycomb structure is not more than 1 mm.

15 18. A method for producing a honeycomb structure according to any one of claims 1-17, wherein kaolin is used as the raw material for the cell structure and the material for forming outer wall and the average particle diameter of kaolin used as the material for forming outer wall is 1/10 or more and

20 1/2 or less of the average particle diameter of kaolin used as the raw material for the cell structure.

19. A honeycomb structure comprising a cell structure provided with an outer wall on the outer peripheral surface thereof which is produced by firing a cell structure being

25 provided with a material for forming outer wall comprising a cell structure having a plurality of cells serving as fluid flowing channels and partitioned by partition walls and a material for forming outer wall which is disposed on the outer

peripheral surface of the cell structure and forms an outer wall upon firing on the cell structure, characterized in that the absolute value of the difference between the proportion of shrinkage in the size of the cell structure after firing to the size of the cell structure before firing and the proportion of shrinkage in the size of the material for forming outer wall after firing to the size of the material for forming outer wall before firing is not more than 0.5%.

20. A honeycomb structure according to claim 19, wherein the main component of the cell structure and/or outer wall is a ceramics.

21. A honeycomb structure according to claim 19 or 20, wherein the absolute value of the difference between the coefficient of thermal expansion of the cell structure after firing and that of the outer wall after firing is not more than $0.7 \times 10^{-6}/°C$.

22. A honeycomb structure according to any one of claims 19-21, wherein the main component of the cell structure after firing is cordierite.

23. A honeycomb structure according to any one of claims 19-22, wherein the cell structure is unfired, and the cell structure being provided with a material for forming outer wall comprising the unfired cell structure and the material for forming outer wall disposed on the outer peripheral surface of the unfired cell structure is fired to produce the honeycomb structure.

24. A honeycomb structure according to any one of claims 19-22, wherein the cell structure being provided with a

material for forming outer wall comprising the previously fired
cell structure and the material for forming outer wall disposed
on the outer peripheral surface of the fired cell structure is
fired to produce the honeycomb structure.

5   25. A honeycomb structure according to any one of claims
19-24, wherein the main component of the outer wall after firing
is cordierite.

       26. A honeycomb structure according to claim 25, wherein
the cell structure being provided with a material for forming
10   outer wall comprising the cell structure and the material for
forming outer wall which is prepared using at least one material
selected from the group consisting of talc, calcined talc,
kaolin, calcined kaolin, alumina, aluminum hydroxide, mullite
and silica so that the material for forming outer wall contains
15   cordierite as a main component after firing and which is
disposed on the outer peripheral surface of the cell structure
is fired, whereby the main component of the outer wall becomes
cordierite.

       27. A honeycomb structure according to any one of claims
20   24-26, wherein the material for forming outer wall contains a
quartz powder in an amount of 1-15% by mass based on the whole
material for forming outer wall.

       28. A honeycomb structure according to any one of claims
19-27, wherein the cell structure being provided with a
25   material for forming outer wall is produced so that the absolute
value of the difference between the proportion of shrinkage in
the size of the cell structure after firing to the size of the
cell structure before firing and the proportion of shrinkage

in the size of the material for forming outer wall after firing
to the size of the material for forming outer wall before firing
is not more than 0.3%.

29. A honeycomb structure according to any one of claims
19-28, wherein the absolute value of the difference between the
coefficient of thermal expansion of the cell structure after
firing and that of the outer wall after firing is not more than
$0.4 \times 10^{-6}/°C$.

30. A honeycomb structure according to any one of claims
19-29, wherein the maximum diameter of the cell structure in
a section formed by cutting the cell structure after firing
along a plane perpendicular to the central axis is not less than
150 mm.

31. A honeycomb structure according to any one of claims
19-30, wherein the outer peripheral surface of the cell
structure is formed of the surface of the outer peripheral wall
provided on the outside of the cells positioned at the outermost
periphery among a plurality of the cells.

32. A honeycomb structure according to any one of claims
19-30, wherein the outer peripheral surface of the cell
structure is formed of the surface of the partition walls of
the cells positioned at the outermost periphery among a
plurality of the cells.

33. A honeycomb structure according to any one of claims
19-30, wherein the outer peripheral surface of the cell
structure is formed by grinding at least a part of the outer
peripheral wall of the cell structure comprising a plurality
of cells serving as fluid flowing channels and provided with

the outer peripheral wall on the outside of the cells positioned at the outermost periphery among a plurality of the cells.

34. A honeycomb structure according to any one of claims 19-30, wherein the surface of the outer wall of the honeycomb structure provided with the outer wall on the outer peripheral surface of the cell structure is subjected to a surface working.

35. A honeycomb structure according to any one of claims 19-34, wherein the honeycomb structure is cylindrical and the difference between the maximum diameter and the minimum diameter of the cylindrical honeycomb structure is not more than 1 mm.

36. A honeycomb structure according to any one of claims 19-35, wherein the cell structure and the outer wall contain kaolin and the average particle diameter of kaolin contained in the material for forming outer wall is 1/10 or more and 1/2 or less of the average particle diameter of kaolin contained in the cell structure.